

004720" 66797960

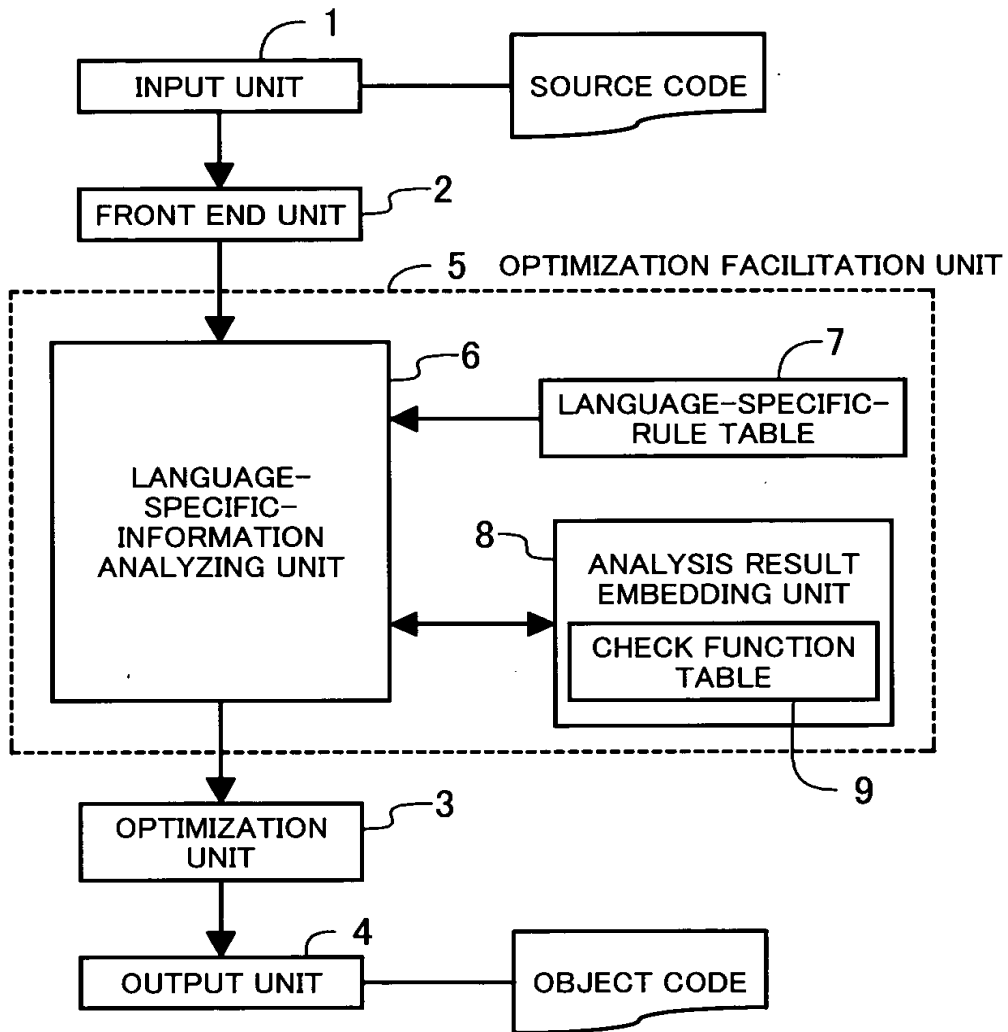


FIG. 1

FIG. 2(A)

LANGUAGE	Fortran77	Fortran90	Fortran95	C	Java	□□	△△
VECTOR REPRESENTATION OF ARRAYS	x	○	○	x	x	○	x
:	:	:	:	:	:	:	:

FIG. 2(B)

No.	LANGUAGE	Fortran90	Fortran95	□□
1	The sizes of arrays on the right-hand and left-hand sides of each assignment statement are identical.	○	○	x
2	The mask size of an array in a where statement is identical with the size of an array on the right-hand side of each assignment statement in the where statement.	○	○	x
:	:	:	:	:

EXAMPLE OF SOURCE CODE

```
1 subroutine sub(a,b,k,L,N)
2 integer(kind=4), dimension(1:6) :: a,b
3 integer(kind=4) :: L,N
4 a(2:L) = b(2:5)
5 b(3:N) = a(1:4)
6 do i=1,L
7   k = k + a(i)
8 enddo
9 end subroutine
```

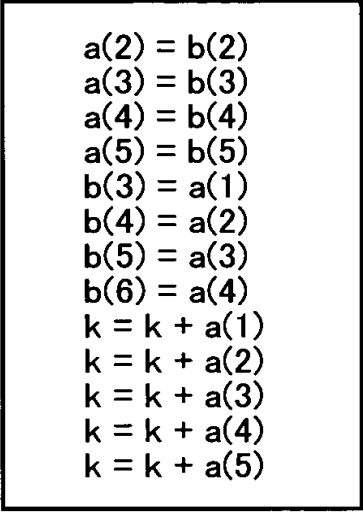
FIG. 3

EMBEDMENT OF ANALYSIS RESULT

```
subroutine sub(a,b,k,L,N)
integer(kind=4), dimension(1:6) :: a,b
integer(kind=4) :: L,N
L=5
a(2:L) = b(2:5)
N=6
b(3:N) = a(1:4)
do i=1,L
    k = k + a(i)
enddo
```

FIG. 4

RESULT OF COMPLETE UNROLLING OF LOOPS



a(2) = b(2)  
a(3) = b(3)  
a(4) = b(4)  
a(5) = b(5)  
b(3) = a(1)  
b(4) = a(2)  
b(5) = a(3)  
b(6) = a(4)  
k = k + a(1)  
k = k + a(2)  
k = k + a(3)  
k = k + a(4)  
k = k + a(5)

FIG. 5

RESULT OF OPTIMIZATION FOR  
ENHANCING DEGREE OF PARALLELISM

```
a(2) = b(2)
a(3) = b(3)
a(4) = b(4)
a(5) = b(5)
b(3) = a(1)
b(4) = a(2)
b(5) = a(3)
b(6) = a(4)
k = k + a(1)
k1 = a(2) + a(3)
k2 = a(4) + a(5)
k = k + k1
k = k + k2
```

FIG. 6

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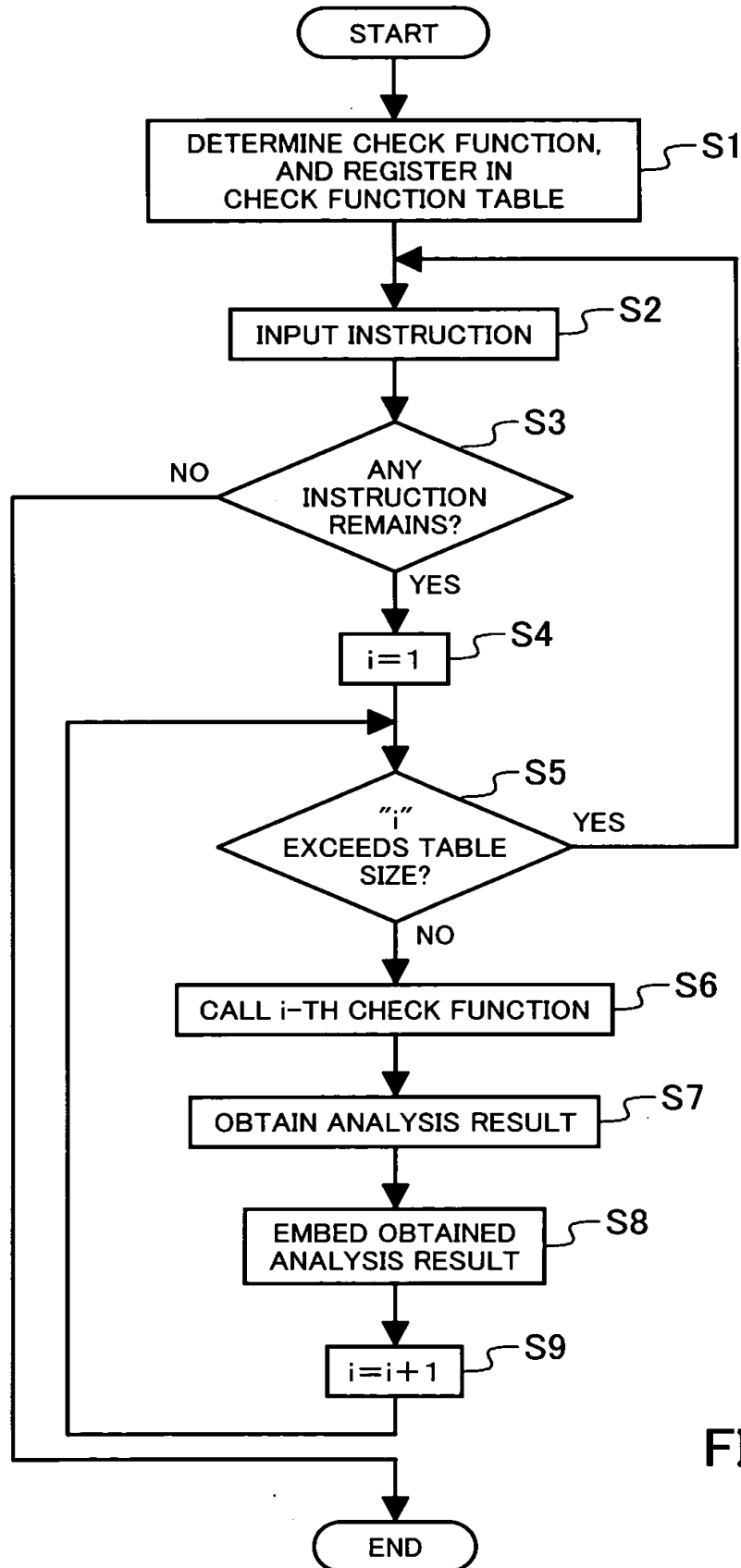


FIG. 7

SOURCE CODE INCLUDING SCALAR  
REPRESENTATION OF ARRAYS

```
1 subroutine sub(r,q)
2 real r(100),q(100)
3 do i=1,100
4 r(i)=q(i)
5 enddo
6 end subroutine
```

PRIOR ART  
FIG. 8(A)

SOURCE CODE INCLUDING VECTOR  
REPRESENTATION OF ARRAYS

```
1 subroutine sub(r,q,L)
2 real r(100),q(100)
3 integer L
4 r(1:L)=q(1:100)
5 end subroutine
```

PRIOR ART  
FIG. 8(B)

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$$\begin{aligned} a(1:L) &= b(2:6) \\ b(2:M) &= c(3:L+2) \\ c(3:N) &= a(1:M-1) \end{aligned}$$

↓

```
do i=1,5 ! OPTIMIZED LOOP
  a(i)=b(i+1)
  b(i+1)=c(i+2)
  c(i+2)=a(i)
enddo
```

PRIOR ART  
FIG. 9